Press Release

Nachi's system partner ATM Automation cuts through Polypipe's flash problem

Nachi have been working closely with there system integrator ATM for some years now and as a highly respected systems solution provider to the plastics industry, ATM has been involved in many diverse and challenging applications. However, when Polypipe asked ATM to devise an automated solution for the removal of flash from their range of blow moulded RIDGIGULLY products, ATM were presented with a highly unusual combination of Design, Process and Health & Safety challenges.

Polypipe Civils is the UK's leading manufacturer of surface water drainage, sewerage, cable protection systems and water management solutions, serving the utilities, construction, civil engineering, agricultural and sports and leisure markets. As part of the Polypipe surface water drainage system, RIDGIGULLY products are blow moulded in HDPE (High-density polyethylene) in 3 different sizes. The post moulded products incorporate significant amounts of flash around the mould joint line which traditionally, has been removed manually. The largest of these parts weighs up to 12 kg and with some areas of flash being up to 12mm thick, as a manual process, this was both time consuming and arduous.

Following a review of various flash removal processes and automation concepts by Polypipe, ATM were chosen to provide a fully automated flash removal system based upon a Nachi six axis robot and a laser. The combination of a laser with a six axis robot is not in itself new, and indeed ATM already had previous experience of building systems of this type for automotive industry customers. Automotive laser cutting applications, by their very nature, are fine tolerance, and whilst this demands precise programming and robot path control, the fact that the components have clearly defined datum points means that the laser and robot together can easily meet the dimensional and profile tolerances required. There are however a number of distinct differences between these automotive projects and the Polypipe application, not least the larger tolerance band of the blow moulded part and the material from which the part is produced.

(Polypipe RIDGIGULLY Components)

Meeting the challenges

From the outset, this was clearly going to be a demanding application and ATM was determined to ensure that the system specification reflected the challenging nature of the project. With three different sizes of product to be laser cut (450mm, 750mm and 850mm) and a requirement to not only remove flash from the moulding, but also to cut a 360 degree path, ATM determined that the optimum solution would be for the robot to hold the part and manipulate it under a fixed laser cutting head. A Nachi six axis robot system with a horizontal reach of 2,000mm and a payload capacity of 50 kg was chosen to provide the working range and handling capacity required for these large components.

ATM chose Rofin-Baasel UK Limited as the supplier of the laser system, based upon their extensive application experience and the excellent reputation for reliability of Rofin CO_2 lasers. A diffusion cooled slab laser with an output power of 2,500W, was selected for the project. Detailed consideration also had to be given to fume extraction and filtration for this project, as the parts being cut are produced from 100% regrind material. This means that the blow mouldings can contain a number of contaminants which could have a detrimental impact on the performance of any extraction and filtration system. Following a series of trials, a multi stage dosing filter system was developed, with the air extracted from the cell being dosed with Calcium Carbonate before reaching the filtration system. To minimise the time associated with cleaning filters and removing debris from the filtration

system, two sets of filters were incorporated. This enables one set of filters to perform a self cleaning cycle, depositing any dust and debris in a bin, whilst the system continues to run using the second set of filters.

The work-cell concept incorporates two component fixtures at the operator load and un-load station. This enables the robot to deposit a completed part and immediately pick up a new part ensuring minimum time is lost between the laser cutting operations. With an internal safety door closed to protect the operator, the finished part can be manually removed and another part loaded for processing by the robot. The robot gripper system and the component location fixtures, incorporate quick change tooling features to enable the system to handle the three different product sizes produced within the cell.

Focused on success

The challenges of this project were not just limited to selecting the most appropriate hardware for the task in hand. The dimensional tolerances from the blow moulding process also had a part to play in the final solution.

The RIDGIGULLY components required flash to be removed from all areas around the mould tool joint line, and in places this flash can be up to 12mm thick. In addition, to enable the flash being removed to be re-processed more easily, the larger areas of waste material had to be cut into smaller pieces. This required intricate programming by the ATM engineers to achieve the balance between reducing the size of the waste material and maintaining the target cycle time.

The major issue yet to be overcome in this application was the need to produce trimmed components with a minimum of excess material, on components which have potentially large part to part variations in size. The variation on each component meant that it was not possible to establish a consistent datum position, from which programme offsets could be generated, and this led the ATM engineers to develop a highly unusual but extremely effective solution.

In almost every laser application, the beam is focussed to a fine spot, at a particular distance from the nozzle or optics, to generate a small spot size and enable precision processing of the part. Even with a powerful laser such as the Rofin DC025 a spot size of 1.0mm is achievable at the appropriate focal distance. This application however did not require such degrees of accuracy, due to the variations in part tolerance, and ATM turned this to their advantage. By developing clever programming techniques and using the laser “Out of Focus”, a larger spot size was achieved. Using the laser outside of its focal point would require more laser power to cut the material, and ATM’s initial choice of a 2,500W laser proved to be a major contributing factor in developing this final solution. The larger spot size together with the higher power settings on the laser enabled the system to not only achieve the cut profiles required during flash removal, but the high temperatures reached during the trimming operation also partially melt the cut area providing a smooth aesthetic finish on the part.

Polypipe has achieved their objectives of turning a labour intensive and arduous task in to a cost effective and highly reliable automated solution. ATM has also clearly demonstrated that difficult and unusual automation applications can become a reality using a combination of field proven hardware lateral thinking, and a determination to satisfy the customer’s requirements..

For further information please contact:

Mr Jason Shuttlewood

Sales Manager
ATM Automation Limited
Winchester Avenue
Blaby
Leicester
LE8 4GZ
Mobile - +44(0)07976 275 877
Telephone - +44(0)116 277 3607
Fax - +44(0)116 277 9800
E-mail - sales@atmautomation.com
Web Site - www.atmautomation.com